

# Calendar



**Blue sky reflects in the primary mirror of the Hobby-Eberly Telescope at McDonald Observatory atop Mount Fowlkes in the Davis Mountains. One of the world's largest optical telescopes, the HET's mirror is 36 feet and made of 91 segments. It is used for spectroscopy and the study of light from stars and galaxies. Photo by Martin Harris; McDonald Observatory.**

**Seasons  
Morning and Evening Stars  
Eclipses, Major Meteor Showers  
Chronological Eras and Cycles  
Calendars for 2016 and 2017**

# Astronomical Calendars for 2016 & 2017

## An Explanation of Texas Time

The subsequent calendars were calculated principally from data on the U.S. Naval Observatory's website (<http://www.usno.navy.mil/USNO>) and from its publications *Astronomical Phenomena for 2016* and *Astronomical Phenomena for 2017*.

Times listed here are **Central Standard Time**, except for the period from 2:00 a.m. on the second Sunday in March until 2:00 a.m. on the first Sunday in November, when **Daylight Saving Time**, which is one hour later than Central Standard Time, is in effect.

All of Texas is in the Central Time Zone, except El Paso and Hudspeth counties and the northwest corner of Culberson County, which observe Mountain Time. Mountain Time is one hour earlier than Central Time.

**All times are calculated for the intersection of 99° 20' west longitude and 31° 08' north latitude**, which is closest to the town of Mercury and is about 15 miles northeast of Brady, McCulloch County. This point is the **approximate geographical center of the state**.

### How to Adjust Rise & Set Times

To adjust the time of sunrise or sunset, moonrise or moonset for any point in Texas, apply the following rule: **Add four minutes** to the time given in this calendar for each degree of longitude that the place lies west of the 99th meridian; **subtract four minutes** for each degree of longitude the place lies east of the 99th meridian.

At times there will be considerable variation for distances north and south of the line of 31° 08' north latitude, but the rule for calculating it is complicated. The formula given above will get sufficiently close results.

The **accompanying map** shows the intersection for which all times given here are calculated, with some major Texas cities and their longitudes. These make it convenient to calculate time at any given point.

## Planetary Configurations & Phenomena

The phenomena and planetary configurations of the heavens for 2016 and 2017 are given in the center column of the calendars on pages 164–171. Below is an explanation of the symbols used in those tables:

○ The Sun	● The Earth	⊕ Uranus
○ The Moon	○ Mars	♀ Neptune
☿ Mercury	♃ Jupiter	♄ Pluto
♀ Venus	♅ Saturn	

### Aspects: Conjunction & Opposition

○ This symbol, appearing between symbols for heavenly bodies, means they are "**in conjunction**," that is, having the same longitude in the sky and appearing near each other. For example, ♀ ○ ☽ means Venus is **north** or **south** of the moon by a few degrees. Conjunctions listed in this calendar are separated by **10 degrees** or less. **Inferior** and **superior conjunctions** mean an inner planet, Venus or Mercury, is in line with the Sun, either between the Earth and the Sun (**inferior**) or on the opposite side of the Sun (**superior**).

○ This symbol means that the heavenly body listed is in "**opposition**" to the Sun, or that they differ by 180 degrees of longitude.

## Common Astronomical Terms

- ★ **Aphelion** — Point at which a planet's orbit is farthest from the sun.
- ★ **Perihelion** — Point at which a planet's orbit is nearest the sun.
- ★ **Apogee** — That point of the moon's orbit farthest from the earth.
- ★ **Perigee** — That point of the moon's orbit nearest the earth.

## The Seasons

### 2016

**Spring** — Saturday, **March 19**, at 11:30 p.m. (CDT);  
**Summer** — Monday, **June 20**, at 5:34 p.m. (CDT);  
**Autumn** — Thursday, **Sept. 22**, at 9:21 a.m. (CDT);  
**Winter** — Wednesday, **Dec. 21**, at 4:44 a.m. (CST).

### 2017

**Spring** — Monday, **March 20**, at 5:29 a.m. (CDT);  
**Summer** — Tuesday, **June 20**, at 11:24 p.m. (CDT);  
**Autumn** — Friday, **Sept. 22**, at 3:02 p.m. (CDT);  
**Winter** — Thursday, **Dec. 21**, at 10:28 a.m. (CST).

## Morning & Evening Stars

### Morning Stars, 2016

Venus ♀ — Jan. 1 – April 30  
Mars ♂ — Jan. 1 – May 22  
Jupiter ♐ — Jan. 1 – March 8; Oct. 10 – Dec. 31  
Saturn ♕ — Jan. 1 – June 3; Dec. 28 – Dec. 31

### Evening Stars, 2016

Venus ♀ — July 14 – Dec. 31  
Mars ♂ — May 22 – Dec. 31  
Jupiter ♐ — March 8 – Sept. 13  
Saturn ♕ — June 3 – Nov. 23

### Morning Stars, 2017

Venus ♀ — March 30 – Nov. 28  
Mars ♂ — Sept. 12 – Dec. 31  
Jupiter ♐ — Jan. 1 – April 7; Nov. 9 – Dec. 31  
Saturn ♕ — Jan. 1 – June 15

### Evening Stars, 2017

Venus ♀ — Jan. 1 – March 22  
Mars ♂ — Jan. 1 – June 7  
Jupiter ♐ — April 7 – Oct. 13  
Saturn ♕ — June 15 – Dec. 5

## Major Meteor Showers

These are **approximate dates**. Listen to local news/weather broadcasts several days beforehand to determine peak observation days and hours. Generally, viewing is best between midnight and dawn of the date listed.

*Meteor shower dates are provided by McDonald Observatory, The University of Texas at Austin.*

Meteor Shower	Peak 2016	Peak 2017
Quadrantid	Jan. 3	Jan. 4
Lyrid	April 21	April 22
Eta Aquarid	May 5	May 6
Perseid	Aug. 12	Aug. 13
Orionid	Oct. 21	Oct. 22
Leonid	Nov. 17	Nov. 18
Geminid	Dec. 13	Dec. 14

## Eclipses

### 2016

**March 8–9 — Sun, total eclipse**, visible in eastern Asia, northern and western Australasia, north Oceania.

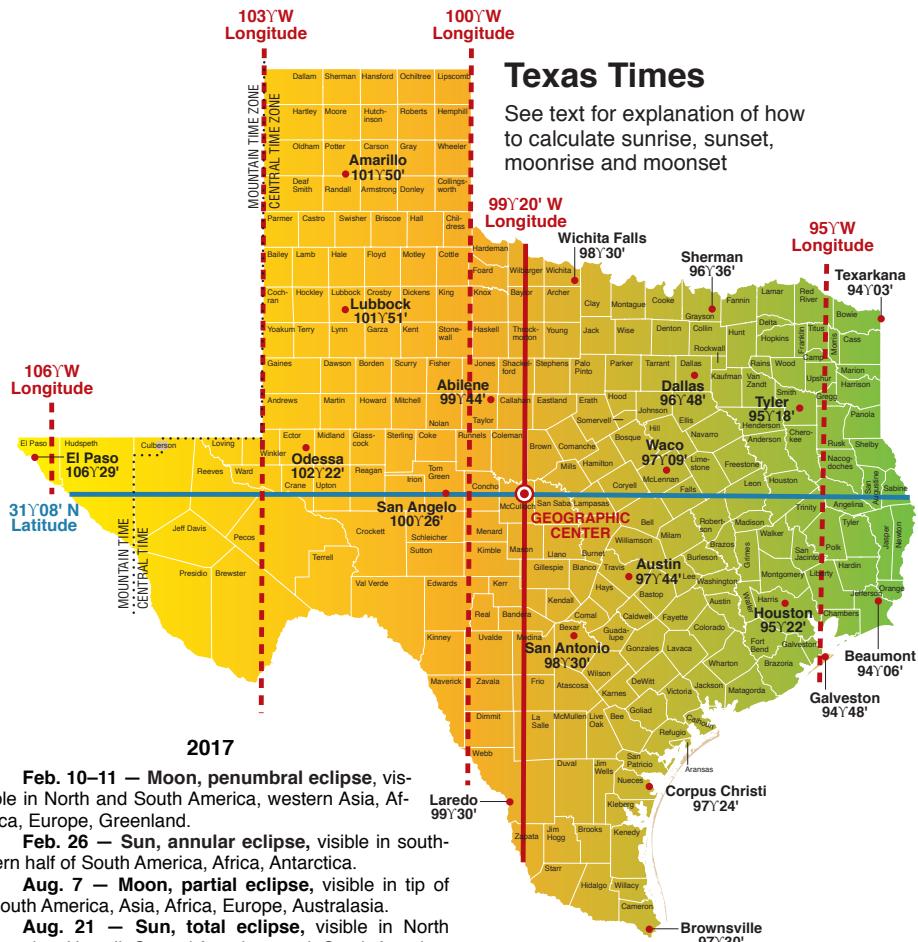
**March 23 — Moon, penumbral eclipse**, visible in North America, west South America, Australasia, Asia.

**May 9 — Transit of Mercury**, visible in the North and South America, most of Asia, Europe, Africa, Greenland, Pacific Ocean.

**Aug. 18 — Moon, penumbral eclipse**, visible in North America, most of South America, Oceania, Australasia, easternmost Asia.

**Sept. 1 — Sun, annular eclipse**, visible in Africa, Madagascar, Antarctica.

**Sept. 16 — Moon, penumbral eclipse**, visible in Australasia, Asia, Africa, Europe, east South America.



## Chronological Eras & Cycles

### Chronological Eras, 2016

The year 2016 of the **Christian** era comprises the latter part of the 240th and the beginning of the 241st year of the independence of the United States of America, and corresponds to the year 6729 of the Julian period. All dates, below, are given in terms of the Gregorian calendar, in which Jan. 14, 2016, corresponds to Jan. 1, 2016, of the Julian calendar:

Era	Year	Begins
Byzantine.....	7525 .....	Sept. 14
Jewish (A.M.)*.....	5777 .....	Oct. 2
Chinese (bīng shēn).....	4653 .....	Feb. 8
Roman (A.U.C.).....	2769 .....	Jan. 14
Nabonassar.....	2765 .....	April 19
Japanese.....	2676 .....	Jan. 1
Grecian (Seleucidæ).....	2328 .....	Sept. 14 or Oct. 14
Indian (Saka).....	1938 .....	March 21
Diocletian (Coptic).....	1733 .....	Sept. 11
Islamic (Hegira)*.....	1438 .....	Oct. 2

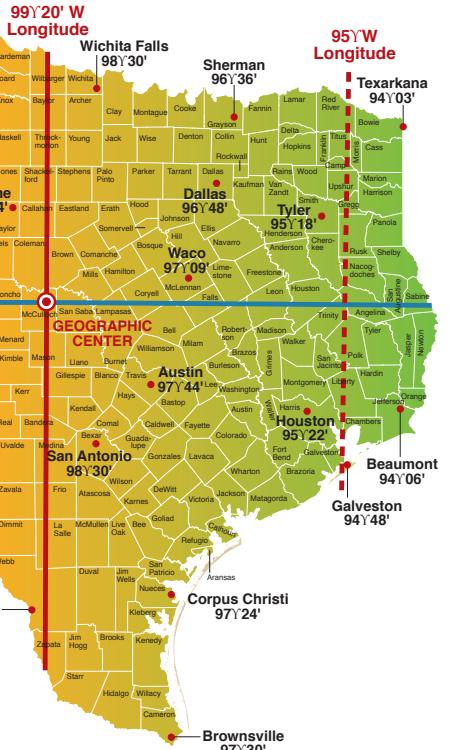
\*Year begins at sunset.

### Chronological Cycles, 2016

Dominical Letter.....CB	Julian Period .....	6729
Epact .....	21 .. Roman Indiction .....	9

## Texas Times

See text for explanation of how to calculate sunrise, sunset, moonrise and moonset



Golden Number or  
Lunar Cycle ..... III      Solar Cycle ..... 9

### Chronological Eras, 2017

The year 2017 of the **Christian** era comprises the latter part of the 241st and the beginning of the 242nd year of the independence of the United States of America, and corresponds to the year 6730 of the Julian period. All dates, below, are given in terms of the Gregorian calendar, in which Jan. 14, 2017, corresponds to Jan. 1, 2017, of the Julian calendar:

Era	Year	Begins
Byzantine.....	7526 .....	Sept. 14
Jewish (A.M.)*.....	5778 .....	Sept. 20
Chinese (dīng yōu).....	4654 .....	Jan. 28
Roman (A.U.C.).....	2770 .....	Jan. 14
Nabonassar.....	2766 .....	April 19
Japanese.....	2677 .....	Jan. 1
Grecian (Seleucidæ).....	2329 .....	Sept. 14 or Oct. 14
Indian (Saka).....	1939 .....	March 22
Diocletian (Coptic).....	1734 .....	Sept. 11
Islamic (Hegira)*.....	1439 .....	Sept. 21

\*Year begins at sunset.

### Chronological Cycles, 2017

Dominical Letter.....A	Julian Period .....	6730
Epact .....	2 .. Roman Indiction .....	10
Golden Number or Lunar Cycle .....	IV	10
Solar Cycle .....		10

# 2016

Times are Central Standard Time, except from March 13 to Nov. 6, during which Daylight Saving Time is observed. Boldface times for moonrise and moonset indicate p.m. Times are figured for the point 99° 20' West and 31° 08' North, the approximate geographical center

of the state. See page 162 for explanation of how to get the approximate time at any other Texas point. (On the web: <http://www.usno.navy.mil/astrometry>) Please note: Not all eclipses are visible in United States. For visibility, see listing beginning on page 162.

1st Month		January 2016		31 Days		February 2016		29 Days		March 2016		31 Days	
Day of	Month	Year	Moonth	Year	Moonth	Year	Moonth	Year	Moonth	Year	Moonth	Year	Moonth
1	1	Fr.	Last qtr. ☽	7336 5:46	12:13	32	1	Mo.	☽ ☾ (3 am)	7:30	6:12	1:03	12:30
2	2	Sa.	● perihelion; ☽ at apogee	7336 5:47	12:46	33	2	Tu.		7:29	6:13	2:06	1:10
3	3	Su.		7336 5:47	1:20	34	3	We.		7:28	6:14	3:00	1:55
4	4	Mo.		7336 5:48	2:31	35	4	Th.		7:28	6:15	3:54	2:44
5	5	Tu.		7336 5:49	3:24	36	5	Fr.		7:27	6:16	4:47	3:38
6	6	We.		7337 5:50	4:18	37	6	Sa.		7:26	6:17	5:39	4:36
7	7	Th.		7337 5:50	5:13	38	7	Su.		7:26	6:18	6:29	5:38
8	8	Fr.		7337 5:51	6:07	39	8	Mo.	☽ New ☽	7:25	6:19	7:16	6:43
9	9	Sa.	New ☽	7337 5:52	7:01	40	9	Tu.	☽ ☽ (6 pm)	7:24	6:19	8:01	7:48
10	10	Su.		7337 5:53	7:51	41	10	We.	(at perigee) (9 pm)	7:23	6:20	8:45	8:54
11	11	Mo.		7337 5:54	8:39	42	11	Th.		7:22	6:21	9:27	10:00
12	12	Tu.		7337 5:55	9:24	43	12	Fr.		7:22	6:22	10:08	11:05
13	13	We.		7337 5:55	10:07	44	13	Sa.		7:21	6:23	10:51	11:33
14	14	Th.	(at perigee) (8 pm)	7337 5:56	10:48	45	14	Mo.		7:20	6:24	11:36	12:09
15	15	Fr.		7336 5:57	11:28	46	15	Mo.	First qtr. ☽	7:19	6:24	12:22	1:12
16	16	Sa.	First qtr. ☽; ☽ ☾	7336 5:58	12:09	47	16	Tu.	Aidebaran ☽ (2 am)	7:18	6:25	1:12	2:13
17	17	Su.		7336 5:59	12:51	48	17	We.	7:17	6:26	2:05	3:11	
18	18	Mo.		7336 6:00	1:36	49	18	Th.	7:16	6:27	2:59	4:05	
19	19	Tu.	Aidebaran ☽ (9 pm)	7336 6:01	2:16	50	19	Fr.	7:15	6:28	3:55	4:55	
20	20	We.		7335 6:02	2:44	51	20	Sa.	7:14	6:28	4:51	5:41	
21	21	Th.		7335 6:02	4:10	52	21	Su.	7:13	6:29	5:47	6:23	
22	22	Fr.		7335 6:03	5:06	53	22	Mo.	7:12	6:30	6:42	7:01	
23	23	Sa.	Full ☽	7334 6:04	6:03	54	23	Tu.	7:11	6:31	7:35	7:37	
24	24	Su.		7334 6:05	7:00	55	24	We.	7:10	6:32	8:28	8:11	
25	25	Mo.		7333 6:06	7:56	56	25	Th.	7:09	6:32	9:21	8:45	
26	26	Tu.		7333 6:07	8:51	57	26	Fr.	(at apogee) (9 pm)	7:08	6:33	10:12	9:18
27	27	We.	● ☽ (7 pm)	7332 6:08	9:44	58	27	Sa.		7:07	6:34	11:04	9:52
28	28	Th.		7332 6:09	10:37	59	28	Su.		7:06	6:35	11:57	10:28
29	29	Fr.		7331 6:10	11:29	60	29	Mo.		7:04	6:35	11:06	11:06
30	30	Sa.	(apogee) (3 am)	7331 6:11	11:18	61	30	We.		7:00	6:36	12:35	11:28
31	31	Su.	Last qtr. ☽	7330 6:11	12:21	62	31	Th.	Daylight Saving Time begins at 2 a.m.	7:28	7:56	1:26	12:16

+ Daylight Saving Time begins at 2 a.m.

91 31 Th. Last qtr. ☽ 7:27 7:56 2:17 1:07

# Astronomical Calendar for 2016

4th Month		April 2016		30 Days		5th Month		May 2016		31 Days		6th Month		June 2016		30 Days		
Moon Phases — New, April 7, 6:24 a.m.; First Qtr., April 13, 10:59 p.m.; Full, April 21, 12:24 a.m.; Last Qtr., April 29, 10:29 p.m.		Moon Phases — New, May 6, 2:30 p.m.; First Qtr., May 13, 12:02 p.m.; Full, May 21, 4:14 p.m.; Last Qtr., May 29, 7:12 a.m.		Day of		Planetary Configurations and Phenomena		Hour of		Planetary Configurations and Phenomena		Hour of		Planetary Configurations and Phenomena		Hour of		
Day	Month	Year	Week	Month	Year	Month	Year	Month	Year	Month	Year	Month	Year	Month	Year	Month	Year	
92	1	Fr.		7:25	7:57	3:06	2:03	122	1	Su.		6:52	8:17	3:17	2:52	153	1	We.
93	2	Sa.		7:24	7:58	3:54	3:02	123	2	Mo.	ψ ♂ ☽ (6 am)	6:51	8:18	3:59	3:55	154	2	Th.
94	3	Su.		7:23	7:58	4:39	4:04	124	3	Tu.		6:51	8:18	4:41	5:01	155	3	Fr.
95	4	Mo.		7:22	7:59	5:23	5:09	125	4	We.		6:50	8:19	5:23	6:08	156	4	Sa. New ☽
96	5	Tu.		7:21	8:00	6:07	6:16	126	5	Th.	☽ (at perigee 11 pm)	6:49	8:20	6:07	7:17	157	5	Su.
97	6	We.		7:19	8:00	6:50	7:24	127	6	Fr.	New ☽	6:48	8:20	6:53	8:26	158	6	Mo.
98	7	Th.	New ☽ at perigee	7:18	8:01	7:34	8:33	128	7	Sa.		6:47	8:21	7:43	9:33	159	7	Tu.
99	8	Fr.		7:17	8:02	8:02	9:42	129	8	Su.		6:46	8:22	8:37	10:38	160	8	We.
100	9	Sa.		7:16	8:02	9:05	10:49	130	9	Mo.	Transit ☽ over ☽	6:46	8:22	9:33	11:37	161	9	Th.
101	10	Su.		7:15	8:03	9:56	11:54	131	10	Tu.		6:45	8:23	10:32		162	10	Fr.
102	11	Mo.		7:13	8:03	10:52		132	11	We.		6:44	8:24	11:30	1:31	163	11	Sa.
103	12	Tu.		7:12	8:04	11:48	12:54	133	12	Th.		6:43	8:24	12:28	1:19	164	12	Su. First qtr. ☽
104	13	We.	First qtr. ☽	7:11	8:05	12:44	1:49	134	13	Fr.	First qtr. ☽	6:43	8:25	1:25	2:01	165	13	Mo.
105	14	Th.		7:10	8:05	1:41	2:38	135	14	Sa.		6:42	8:26	2:19	2:40	166	14	Tu.
106	15	Fr.		7:09	8:06	2:37	3:22	136	15	Su.		6:41	8:26	3:13	3:15	167	15	We. (at apogee 7 am)
107	16	Sa.		7:08	8:07	3:31	4:02	137	16	Mo.		6:41	8:27	4:05	3:49	168	16	Th.
108	17	Su.		7:07	8:07	4:26	4:39	138	17	Tu.		6:40	8:28	4:57	4:22	169	17	Fr.
109	18	Mo.	☽ ☽ (12 am)	7:05	8:08	5:18	5:14	139	18	We.	(at apogee 15 pm)	6:40	8:28	5:49	4:55	170	18	Sa. ☽ ☽ (7 pm)
110	19	Tu.		7:04	8:09	6:10	5:47	140	19	Th.		6:39	8:29	6:41	5:29	171	19	Su.
111	20	We.		7:03	8:09	7:02	6:20	141	20	Fr.		6:39	8:30	7:34	6:05	172	20	Mo. Full ☽ Solstice (5:34 pm)
112	21	Th.	(at apogee 11 am)	7:02	8:10	7:54	6:53	142	21	Sa.	Full ☽	6:38	8:30	8:27	6:43	173	21	Tu.
113	22	Fr.	Full ☽	7:01	8:11	8:46	7:28	143	22	Su.		6:38	8:31	9:19	7:24	174	22	We.
114	23	Sa.		7:00	8:11	9:38	8:04	144	23	Mo.		6:37	8:32	10:11	8:09	175	23	Th.
115	24	Su.	☽ ☽ (11 pm)	6:59	8:12	10:31	8:44	145	24	Tu.		6:37	8:32	11:01	8:58	176	24	Fr.
116	25	Mo.		6:58	8:13	11:23	9:26	146	25	We.		6:36	8:33	11:48	9:50	177	25	Sa.
117	26	Tu.		6:57	8:13	10:12		147	26	Th.		6:36	8:33	10:46		178	26	Su.
118	27	We.		6:56	8:14	12:13	11:02	148	27	Fr.		6:35	8:34	12:33	11:43	179	27	Mo. Last qtr. ☽
119	28	Th.		6:55	8:15	1:11	11:55	149	28	Sa.		6:35	8:35	1:57	1:44	180	28	Tu.
120	29	Fr.	Last qtr. ☽	6:54	8:15	1:49	12:51	150	29	Su.	Last qtr. ☽	6:35	8:35	3:49	2:46	181	29	We.
121	30	Sa.		6:53	8:16	2:34	1:50	151	30	Mo.		6:35	8:36	2:38	2:46	182	30	Th.
				152	31	Tu.						6:34	8:36	3:18	3:51			

Astrological Calendar for 2016		6th Month		July 2016		Moon Phases — New, July 4, 10:00 p.m.; First Qtr., July 12, 3:10 a.m.; Full, July 20, 6:02 a.m.; Last Qtr., July 27, 1:19 p.m.		Day of		Planetary Configurations and Phenomena		Hour of		Planetary Configurations and Phenomena		Hour of		
Day	Month	Year	Week	Month	Year	Month	Year	Month	Year	Month	Year	Month	Year	Month	Year	Month	Year	
1	1	Fr.		7:25	7:57	3:06	2:03	122	1	Su.		6:52	8:17	3:17	2:52	153	1	We.
2	2	Sa.		7:24	7:58	3:54	3:02	123	2	Mo.	ψ ♂ ☽ (6 am)	6:51	8:18	3:59	3:55	154	2	Th.
3	3	Su.		7:23	7:58	4:39	4:04	124	3	Tu.		6:51	8:18	4:41	5:01	155	3	Fr.
4	4	Mo.		7:22	7:59	5:23	5:09	125	4	We.		6:50	8:19	5:23	6:08	156	4	Sa. New ☽
5	5	Tu.		7:21	8:00	6:07	6:16	126	5	Th.	☽ (at perigee 11 pm)	6:49	8:20	6:07	7:17	157	5	Su.
6	6	We.		7:19	8:00	6:50	7:24	127	6	Fr.	New ☽	6:48	8:20	6:53	8:26	158	6	Mo.
7	7	Th.	New ☽ at perigee	7:18	8:01	7:34	8:33	128	7	Sa.		6:47	8:21	7:43	9:33	159	7	Tu.
8	8	Fr.		7:17	8:02	8:20	9:42	129	8	Su.		6:46	8:22	8:37	10:38	160	8	We.
9	9	Sa.		7:16	8:02	9:05	10:49	130	9	Mo.	Transit ☽ over ☽	6:46	8:22	9:33	11:37	161	9	Th.
10	10	Su.		7:15	8:03	9:56	11:54	131	10	Tu.		6:45	8:23	10:32		162	10	Fr.
11	11	Mo.		7:13	8:03	10:52		132	11	We.		6:44	8:24	11:30	1:31	163	11	Sa.
12	12	Tu.		7:12	8:04	11:48	12:54	133	12	Th.		6:43	8:24	12:28	1:19	164	12	Su. First qtr. ☽
13	13	We.	First qtr. ☽	7:11	8:05	12:44	1:49	134	13	Fr.		6:43	8:25	1:25	2:01	165	13	Mo.
14	14	Th.		7:10	8:05	1:41	2:38	135	14	Sa.		6:42	8:26	2:19	2:40	166	14	Tu.
15	15	Fr.		7:09	8:06	2:37	3:22	136	15	Su.		6:41	8:26	3:13	3:15	167	15	We. (at apogee 7 am)
16	16	Sa.		7:08	8:07	3:31	4:02	137	16	Mo.		6:41	8:27	4:05	3:49	168	16	Th.
17	17	Su.		7:07	8:07	4:26	4:39	138	17	Tu.		6:40	8:28	4:57	4:22	169	17	Fr.
18	18	Mo.	☽ ☽ (12 am)	7:05	8:08	5:18	5:14	139	18	We.	(at apogee 15 pm)	6:40	8:28	5:49	4:55	170	18	Sa. ☽ ☽ (7 pm)
19	19	Tu.		7:04	8:09	6:10	5:47	140	19	Th.		6:39	8:29	6:41	5:29	171	19	Su.
20	20	We.		7:03	8:09	7:02	6:20	141	20	Fr.		6:39	8:30	7:34	6:05	172	20	Mo. Full ☽ Solstice (5:34 pm)
21	21	Th.	(at apogee 11 am)	7:02	8:10	7:54	6:53	142	21	Sa.	Full ☽	6:38	8:30	8:27	6:43	173	21	Tu.
22	22	Fr.	Full ☽	7:01	8:11	8:46	7:28	143	22	Su.		6:38	8:31	9:19	7:24	174	22	We.
23	23	Sa.		7:00	8:11	9:38	8:04	144	23	Mo.		6:37	8:32	10:11	8:09	175	23	Th.
24	24	Su.	☽ ☽ (11 pm)	6:59	8:12	10:31	8:44	145	24	Tu.		6:37	8:32	11:01	8:58	176	24	Fr.
25	25	Mo.		6:58	8:13	11:23	9:26	146	25	We.		6:36	8:33	11:48	9:50	177	25	Sa.
26	26	Tu.		6:57	8:13	10:12		147	26	Th.		6:36	8:33	10:46		178	26	Su.
27	27	We.		6:56	8:14	12:13	11:02	148	27	Fr.		6:35	8:34	12:33	11:43	179	27	Mo. Last qtr. ☽
28	28	Th.		6:55	8:15	1:11	11:55	149	28	Sa.		6:35	8:35	1:57	1:44	180	28	Tu.
29	29	Fr.	Last qtr. ☽	6:54	8:15	1:49	12:51	150	29	Su.	Last qtr. ☽	6:35	8:35	3:49	2:46	181	29	We.
30	30	Sa.		6:53	8:16	2:34	1:50	151	30	Mo.		6:35	8:36	2:38	2:46	182	30	Th.
				152	31	Tu.						6:34	8:36	3:18	3:51			

# Astronomical Calendar for 2016

7th Month		July 2016		31 Days		8th Month		August 2016		31 Days		9th Month		September 2016		30 Days		
Moon Phases — New, July 4, 6:01 a.m.; First Qtr., July 11, 7:52 p.m.; Full, July 19, 5:57 p.m.; Last Qtr., July 26, 6:00 p.m.		Moon Phases — New, Aug. 2, 3:45 p.m.; First Qtr., Aug. 10, 1:21 p.m.; Full, Aug. 18, 4:27 a.m.; Last Qtr., Aug. 24, 10:41 p.m.		Moon Phases — New, Sept. 1, 4:03 a.m.; First Qtr., Sept. 9, 6:49 a.m.; Full, Sept. 16, 2:05 p.m.; Last Qtr., Sept. 23, 4:56 a.m.; New, Sept. 30, 7:11 p.m.		Moon Phases — New, Sept. 1, 4:03 a.m.; First Qtr., Sept. 9, 6:49 a.m.; Full, Sept. 16, 2:05 p.m.; Last Qtr., Sept. 23, 4:56 a.m.; New, Sept. 30, 7:11 p.m.		Moon Phases — New, Sept. 1, 4:03 a.m.; First Qtr., Sept. 9, 6:49 a.m.; Full, Sept. 16, 2:05 p.m.; Last Qtr., Sept. 23, 4:56 a.m.; New, Sept. 30, 7:11 p.m.		Moon Phases — New, Sept. 1, 4:03 a.m.; First Qtr., Sept. 9, 6:49 a.m.; Full, Sept. 16, 2:05 p.m.; Last Qtr., Sept. 23, 4:56 a.m.; New, Sept. 30, 7:11 p.m.		Moon Phases — New, Sept. 1, 4:03 a.m.; First Qtr., Sept. 9, 6:49 a.m.; Full, Sept. 16, 2:05 p.m.; Last Qtr., Sept. 23, 4:56 a.m.; New, Sept. 30, 7:11 p.m.		Moon Phases — New, Sept. 1, 4:03 a.m.; First Qtr., Sept. 9, 6:49 a.m.; Full, Sept. 16, 2:05 p.m.; Last Qtr., Sept. 23, 4:56 a.m.; New, Sept. 30, 7:11 p.m.		Moon Phases — New, Sept. 1, 4:03 a.m.; First Qtr., Sept. 9, 6:49 a.m.; Full, Sept. 16, 2:05 p.m.; Last Qtr., Sept. 23, 4:56 a.m.; New, Sept. 30, 7:11 p.m.		
Day of Year	Month	Day of Month	Hour of Day	Planetary Configurations and Phenomena	Hour of Day	Planetary Configurations and Phenomena	Hour of Day	Planetary Configurations and Phenomena	Hour of Day	Planetary Configurations and Phenomena	Hour of Day	Planetary Configurations and Phenomena	Hour of Day	Planetary Configurations and Phenomena	Hour of Day	Planetary Configurations and Phenomena	Hour of Day	
Year	Month	Day	Hour	Week	Month	Week	Year	Month	Week	Month	Week	Year	Month	Week	Year	Month	Week	
183 1 Fr. ☽ at perigee (2 am)	July	1	4:00	4-10	Mo.	214 1 Mo.	July	1	4:00	4-10	Mo.	6:55 8:32	5:43	7:39	245 1 Th.	New ☽	7:14 8:00	7:26 8:19
184 2 Sa.		2				215 2 Tu.	New ☽	2				6:56 8:31	6:43	8:25	246 2 Fr.		7:14 7:59	8:15 8:54
185 3 Su.		3				216 3 We.		3				6:56 8:31	7:42	9:07	247 3 Sa.		7:15 7:57	9:15 9:28
186 4 Mo. ● at aphelion; New ☽		4				217 4 Th.		4				6:57 8:30	8:40	9:45	248 4 Su.		7:15 7:56	10:08 10:01
187 5 Tu.		5				218 5 Fr.	2○ ☽ (11 pm)	5				6:57 8:29	9:36	10:21	249 5 Mo.		7:16 7:55	11:01 10:36
188 6 We.		6				219 6 Sa.		6				6:58 8:28	10:31	10:55	250 6 Tu.	☽ at apogee (2 pm)	7:17 7:52	12:45 11:51
189 7 Th.		7				220 7 Su.		7				6:58 8:27	11:25	11:29	251 7 We.		7:18 7:51	1:37
190 8 Fr.		8				221 8 Mo.		8				6:59 8:26	12:17		252 8 Th.		7:18 7:50	2:28 12:32
191 9 Sa.		9				222 9 Tu.	☽ at apogee (7 pm)	9				7:00 8:25	1:09	12:03	253 9 Fr.	First qtr. ☽	7:19 7:49	3:19 1:18
192 10 Su.		10				223 10 We.	First qtr. ☽	10				7:00 8:24	2:02	12:38	254 10 Sa.		7:20 7:47	4:09 2:07
193 11 Mo. First qtr. ☽		11				224 11 Tu.	○ ☽ (5 pm)	11				7:01 8:23	2:54	1:15	255 11 Su.		7:20 7:46	4:57 3:01
194 12 Tu.		12				225 12 Fr.	1:30	12				7:02 8:22	3:46	1:55	256 12 Mo.		7:21 7:45	5:43 3:58
195 13 We. ☽ at apogee (12 am)		13				226 13 Sa.		13				7:02 8:21	4:39	2:39	257 13 Tu.		7:21 7:44	6:27 4:59
196 14 Th.		14				227 14 Su.		14				7:03 8:20	5:30	3:27	258 14 We.		7:22 7:42	7:10 6:02
197 15 Fr.		15				228 15 Sa.		15				7:03 8:19	6:20	4:19	259 15 Su.		7:23 7:41	7:52 7:07
198 16 We. ○ ☽ (12 am)		16				229 16 Tu.		16				7:04 8:18	7:07	5:16	260 16 Fr.	Full ☽	7:23 7:40	8:34 8:13
199 17 Su.		17				230 17 We.		17				7:05 8:17	7:53	6:15	261 17 Sa.	♀ ♂ Spica (6 pm)	7:24 7:38	9:17 9:20
200 18 Mo.		18				231 18 Th.	Full ☽; Eclipse ☽	18				7:05 8:16	8:36	7:17	262 18 Su.	☽ at perigee (12 pm)	7:24 7:37	10:20 10:27
201 19 Tu. Full ☽		19				232 19 Fr.	Ψ ○ ☽ (7 am)	19				7:06 8:15	9:18	8:21	263 19 Mo.		7:25 7:36	10:50 11:33
202 20 We.		20				233 20 Sa.		20				7:07 8:14	9:59	9:25	264 20 Tu.		7:25 7:34	11:41 12:38
203 21 Th.		21				234 21 Su.	☽ at perigee (8 pm)	21				7:07 8:13	10:40	10:29	265 21 We.		7:26 7:33	1:40
204 22 Fr.		22				235 22 Mo.	○ ☽ (5 am)	22				7:08 8:12	11:22	11:34	266 22 Th.	Equinox (9:21 am)	7:26 7:32	12:35 2:38
205 23 Sa.		23				236 23 Tu.	○ ☽ Antares (11 pm)	23				7:08 8:11	12:39		267 23 Fr.	Last qtr. ☽	7:27 7:31	1:31
206 24 Su.		24				237 24 We.	Last qtr. ☽	24				7:09 8:09	12:06	1:43	268 24 Sa.		7:28 7:29	2:28 4:19
207 25 Mo.		25				238 25 Th.		25				7:10 8:08	12:54	2:45	269 25 Su.		7:28 7:28	3:26 5:02
208 26 Tu. Last qtr. ☽		26				239 26 Fr.		26				7:10 8:07	1:45	3:45	270 26 Mo.		7:28 7:28	
209 27 We. ☽ at perigee (7 am)		27				240 27 Sa.	♀ ○ ♀ (12 am)	27				7:11 8:06	2:39	4:41	271 27 Tu.		7:29 7:27	4:23 5:42
210 28 Th.		28				241 28 Su.	2○ 3:49	28				7:11 8:05	3:35	5:33	272 28 We.		7:29 7:25	5:19 6:19
211 29 Fr. Aldebaran ○ (6 am)		29				242 29 Mo.		29				7:12 8:04	4:33	6:20	273 29 Th.	♀ ○ (6 am)	7:30 7:24	6:14 6:54
212 30 Sa.		30				243 30 Tu.		30				7:13 8:02	5:32	7:03	274 30 Fr.	New ☽	7:31 7:23	7:08 7:28
213 31 Su.		31				244 31 We.		31				7:13 8:01	6:29	7:42				

Bright stars = Aldebaran, Antares, Spica, Pollux, Regulus. Minor planets or asteroids = Ceres, Pallas, Juno, Vesta. ☽ = in conjunction by 10° or <. ♂ = opposition to ☎

# Astronomical Calendar for 2016

10th Month      October 2016      31 Days		11th Month      November 2016      30 Days		12th Month      December 2016      31 Days	
Moon Phases — First Qtr., Oct. 8, 11:33 p.m.; Full, Oct. 15, 11:23 p.m. Last Qtr., Oct. 22, 2:14 p.m.; New, Oct. 30, 12:38 p.m.		Moon Phases — First Qtr., Nov. 7, 1:51 p.m.; Full, Nov. 14, 7:52 a.m.; Last Qtr., Nov. 21, 2:33 a.m.; New, Nov. 29, 6:18 a.m.		Moon Phases — First Qtr., Dec. 7, 3:03 a.m.; Full, Dec. 13, 6:06 p.m.; Last Qtr., Dec. 20, 7:56 p.m.; New, Dec. 29, 12:53 a.m.	
Day of Year	Planetary Configurations and Phenomena	Day of Year	Planetary Configurations and Phenomena	Day of Year	Planetary Configurations and Phenomena
275 1 Sa.	7:31 7:22 8:01 <b>8:01</b>	306 1 Tu.	7:53 6:48 9:26 <b>8:27</b>	336 1 Th.	7:18 5:35 8:55 <b>7:40</b>
276 2 Su.	7:32 7:20 8:54 <b>8:35</b>	307 2 We.	7:54 6:47 10:17 <b>9:09</b>	337 2 Fr.	7:19 5:35 9:43 <b>8:31</b>
277 3 Mo.	7:33 7:19 9:46 <b>9:11</b>	308 3 Th.	7:55 6:47 11:08 <b>9:54</b>	338 3 Sa.	7:20 5:35 10:29 <b>9:24</b>
278 4 Tu. (at apogee 6 am)	7:33 7:18 10:38 <b>9:48</b>	309 4 Fr.	7:56 6:46 11:57 <b>10:43</b>	339 4 Su.	7:21 5:35 11:12 <b>10:20</b>
279 5 We.	7:34 7:17 11:30 <b>10:28</b>	310 5 Sa.	7:56 6:45 12:44 <b>11:35</b>	340 5 Mo.	7:22 5:35 11:53 <b>11:18</b>
280 6 Th.	7:34 7:16 12:21 <b>11:12</b>	311 † 6 Su. DST ends	6:57 5:44 12:29 <b>11:30</b>	341 6 Tu.	7:22 5:35 <b>12:33</b>
281 7 Fr.	7:35 7:14 1:12 <b>11:59</b>	312 7 Mo. First qtr. ☽	6:58 5:44 1:13	342 7 We. First qtr. ☽	7:23 5:35 <b>1:11</b> <b>12:17</b>
282 8 Sa. First qtr. ☽	7:36 7:13 2:01	313 8 Tu.	6:59 5:43 1:54 1:22	343 8 Th.	7:24 5:35 <b>1:35</b> <b>1:18</b>
283 9 Su.	7:36 7:12 2:48 <b>12:49</b>	314 9 We.	7:00 5:42 2:34 1:27	344 9 Fr.	7:25 5:35 <b>2:30</b> <b>2:20</b>
284 10 Mo.	7:37 7:11 3:34 <b>1:44</b>	315 10 Th.	7:01 5:42 3:15 2:29	345 10 Sa.	7:25 5:35 <b>3:13</b> <b>3:25</b>
285 11 Tu.	7:38 7:10 4:18 <b>2:41</b>	316 11 Fr.	7:01 5:41 3:56 3:33	346 11 Su.	7:26 5:36 <b>4:01</b> <b>4:51</b>
286 12 We.	7:38 7:09 5:00 <b>3:42</b>	317 12 Sa.	7:02 5:40 4:39 4:40	347 12 Mo. (at perigee 5 pm)	7:27 5:36 <b>4:51</b> <b>5:41</b>
287 13 Th. $\Psi \sigma$ (1 am)	7:39 7:07 <b>5:42</b> <b>4:45</b>	318 13 Su.	7:03 5:40 5:25 5:48	348 13 Tu. Full ☽	7:27 5:36 <b>5:47</b> <b>6:49</b>
288 14 Fr.	7:40 7:06 <b>6:24</b> <b>5:50</b>	319 14 Mo. Full ☽ (at perigee 5 am)	7:04 5:39 6:15 6:58	349 14 We.	7:28 5:37 <b>6:47</b> <b>7:54</b>
289 15 Sa.	Full ☽; $\dot{\delta} \sigma$ (9 pm)	7:40 7:05 <b>7:07</b> <b>6:57</b>	320 15 Tu.	7:05 5:39 7:09 8:07	350 15 Th.
290 16 Su. (at perigee 7 pm)	7:41 7:04 <b>7:52</b> <b>8:05</b>	321 16 We.	7:06 5:38 8:08 9:13	351 16 Fr.	7:29 5:37 <b>8:53</b> <b>9:49</b>
291 17 Mo.	7:42 7:03 <b>8:40</b> <b>9:14</b>	322 17 Th.	7:07 5:38 9:08 10:15	352 17 Sa.	7:30 5:38 <b>9:54</b> <b>10:37</b>
292 18 Tu.	7:43 7:02 <b>9:31</b> <b>10:22</b>	323 18 Fr.	7:07 5:38 10:09 11:10	353 18 Su.	7:30 5:38 <b>10:53</b> <b>11:19</b>
293 19 We. Aldebaran $\sigma$ (2 am)	7:43 7:01 10:26 <b>11:28</b>	324 19 Sa.	7:08 5:37 11:09 11:59	354 19 Mo.	7:31 5:39 <b>11:50</b> <b>11:58</b>
294 20 Th.	7:44 7:00 11:23 <b>12:30</b>	325 20 Su.	7:09 5:37 <b>12:43</b>	355 20 Tu. Last qtr. ☽	7:31 5:39 <b>12:33</b>
295 21 Fr.	7:45 6:59 <b>1:27</b>	326 21 Mo. Last qtr. ☽	7:10 5:36 12:08 <b>1:22</b>	356 21 We. Solstice (4:44 am)	7:32 5:40 <b>12:45</b> <b>1:07</b>
296 22 Sa. Last qtr. ☽	7:45 6:57 12:22 <b>2:17</b>	327 22 Tu.	7:11 5:36 1:04 <b>1:58</b>	357 22 Th.	7:32 5:40 <b>1:38</b> <b>1:40</b>
297 23 Su.	7:46 6:56 1:20 <b>3:03</b>	328 23 We.	7:12 5:36 1:59 <b>2:32</b>	358 23 Fr.	7:33 5:41 <b>2:31</b> <b>2:13</b>
298 24 Mo.	7:47 6:55 2:18 <b>3:43</b>	329 24 Th.	7:13 5:36 2:52 <b>3:05</b>	359 24 Sa.	7:33 5:41 <b>3:23</b> <b>2:48</b>
299 25 Tu. $\dot{\varphi} \sigma$ Antares (11 pm)	7:48 6:55 3:14 <b>4:21</b>	330 25 Fr.	7:13 5:35 3:44 <b>3:38</b>	360 25 Su. (at apogee 11 am)	7:34 5:42 4:15 <b>3:25</b>
300 26 We.	7:48 6:54 4:09 <b>4:56</b>	331 26 Sa.	7:14 5:35 4:37 <b>4:12</b>	361 26 Mo.	7:34 5:42 5:07 <b>4:05</b>
301 27 Th.	7:49 6:53 <b>5:03</b> <b>5:29</b>	332 27 Su. (at apogee 2 am)	7:15 5:35 5:29 <b>4:48</b>	362 27 Tu.	7:35 5:43 5:59 <b>4:49</b>
302 28 Fr. $\dot{\varphi} \sigma$ (5 am)	7:50 6:52 <b>5:06</b> <b>6:03</b>	333 28 Mo.	7:16 5:35 6:21 <b>5:26</b>	363 28 We.	7:35 5:44 6:51 <b>5:36</b>
303 29 Sa.	7:51 6:51 <b>6:49</b> <b>6:36</b>	334 29 Tu. New ☽	7:17 5:35 7:13 <b>6:07</b>	364 29 We. New ☽	7:35 5:44 7:40 <b>6:26</b>
304 30 Su. New ☽; $\dot{\varphi} \sigma$ (3 am)	7:52 6:50 <b>7:41</b> <b>7:11</b>	335 30 We.	7:18 5:35 8:05 <b>6:52</b>	365 30 Fr.	7:35 5:45 8:28 <b>7:20</b>
305 31 Mo. (at apogee 2 pm)	7:52 6:49 <b>8:33</b> <b>7:48</b>	<b>Daylight Saving Time ends at 2 a.m.</b>		366 31 Sa.	7:36 5:46 9:12 <b>8:15</b>

# 2017

Times are Central Standard Time, except from March 12 to Nov. 5, during which Daylight Saving Time is observed. **Boldface times** for moonrise and moonset indicate p.m. Times are figured for the point 99° 20' West and 31° 08' North, the approximate geographical center of the state. See page 162.

1st Month		January 2017		31 Days	
Day of	Year	Hour of	Planetary Configurations and Phenomena	Hour of	Planetary Configurations and Phenomena
1	Mon.	9:36	Moon Phases — <i>First Qtr.</i> , Jan. 5, 1:47 p.m.; <i>Full</i> , Jan. 12, 5:34 a.m.; <i>Last Qtr.</i> , Jan. 19, 4:13 p.m.; <i>New</i> , Feb. 26, 8:58 a.m.	7:36	Moon Phases — <i>First Qtr.</i> , Feb. 3, 10:19 p.m.; <i>Full</i> , Feb. 10, 6:33 p.m.; <i>Last Qtr.</i> , Feb. 18, 1:33 p.m.; <i>New</i> , Feb. 26, 8:58 a.m.
2	Tue.	9:52		5:46	
3	Wed.	10:11		5:47	
4	Thu.	11:11		5:48	
5	Fri.	11:51	● at perihelion (8 am)	5:49	11:51
6	Sat.	12:11	First qtr. ☽ & ☽ (8 pm)	5:50	12:29
7	Sun.	1:13		5:50	
8	Mon.	2:17		5:51	
9	Tue.	3:22		5:52	
10	Wed.	4:28		5:53	
11	Thu.	5:33		5:54	
12	Fri.	6:35		5:55	
13	Sat.	7:33		6:31	
14	Sun.	7:34		7:33	
15	Mon.	7:36	Regulus, ☽ (11 pm)	8:36	9:11
16	Tue.	7:36		9:36	
17	Wed.	7:36		10:30	
18	Thu.	7:36		11:28	
19	Fri.	7:36		11:39	
20	Sat.	7:35	● at apogee (6 pm)	12:22	12:13
21	Sun.	7:35		12:48	
22	Mon.	7:34		1:24	
23	Tue.	7:34		2:59	
24	Wed.	7:34		3:51	
25	Thu.	7:33	● at (4 am)	4:43	3:29
26	Fri.	7:33		6:02	
27	Sa.	7:33	● at apogee (6 pm)	6:07	
28	Sun.	7:32		6:09	
29	Mon.	7:31		6:10	
30	Tue.	7:30		6:11	
31	Wed.	7:30	● at (7 pm)	6:12	10:05

page 162 for explanation of how to get the approximate time at any other Texas point. (On the web: <http://www.usno.navy.mil/astrometry>) Please note: Not all eclipses are visible in United States. For visibility, see listing beginning on page 162.

2nd Month		February 2017		28 Days	
Day of	Year	Hour of	Planetary Configurations and Phenomena	Day of	Planetary Configurations and Phenomena
1	Sun.	9:13	○ ☽ (1 am)	5:46	9:13
2	Mon.	10:11	○ ☽ (10 pm)	5:47	10:35
3	Tue.	11:11		5:48	11:13
4	Wed.	11:51		5:49	11:51
5	Thu.	12:11	First qtr. ☽	5:50	12:29
6	Fri.	1:13		5:50	
7	Sa.	2:17		5:51	
8	Sun.	3:22		5:52	
9	Mon.	4:28		5:53	
10	Tu.	5:33	● at perigee (12 am)	5:54	6:21
11	We.	6:35		5:55	
12	Th.	7:33	Full ☽; ♀ ☽ (8 pm)	5:56	7:33
13	Fri.	8:33		5:57	
14	Sat.	9:33		5:58	
15	Sun.	10:30		5:59	
16	Mon.	11:28		6:00	
17	Tu.	11:39		6:00	
18	We.	12:13		6:00	
19	Th.	12:22	Last qtr. ☽	6:01	12:13
20	Fri.	7:35	6:02	1:15	12:48
21	Sa.	7:35	6:03	2:07	1:24
22	Su.	7:34	6:04	2:59	2:02
23	Mo.	7:34	6:05	3:51	2:44
24	Tu.	7:33	6:06	4:43	3:29
25	We.	7:33	6:07	5:33	4:19
26	Th.	7:33	6:08	6:22	5:11
27	Fri.	7:32	6:09	7:09	6:07
28	Sa.	7:32	6:10	7:53	7:05
29	Sun.	7:31	6:11	8:34	8:04
30	Mon.	7:30	6:12	9:14	9:05
31	Tu.	7:30	6:12	9:53	10:05

↑ Daylight Saving Time begins at 2 a.m.

3rd Month		March 2017		31 Days	
Day of	Year	Hour of	Planetary Configurations and Phenomena	Day of	Planetary Configurations and Phenomena
1	Sun.	11:07	○ ☽ (9 pm)	5:46	11:10
2	Mon.	12:10		5:47	11:10
3	Tue.	1:10		5:48	11:51
4	Wed.	2:11		5:49	12:09
5	Thu.	3:12		5:50	12:35
6	Fri.	4:12	Fr. (at perigee (2 am))	5:51	12:35
7	Sa.	5:13		5:52	1:13
8	Sun.	6:14		5:53	1:13
9	Mon.	7:15		5:54	2:17
10	Tu.	8:16		5:55	3:20
11	We.	9:17		5:56	4:21
12	Th.	10:18		5:57	5:19
13	Fri.	11:23		5:58	6:19
14	Sat.	12:23		5:59	7:19
15	Sun.	1:23		6:00	8:18
16	Mon.	2:24		6:01	9:15
17	Tu.	3:25		6:02	10:36
18	We.	4:26		6:03	14: Tu.
19	Th.	5:27		6:04	15: We.
20	Fri.	6:28		6:05	16: Th.
21	Sa.	7:29		6:06	17: Fr.
22	Sun.	8:30		6:07	18: Sa.
23	Mon.	9:30	(at apogee (12 pm))	6:08	19: Su.
24	Tu.	10:30		6:09	20: Mo. Equinox (5:29 am)
25	We.	11:30		6:10	21: 7:49 2:15 1:01
26	Th.	12:30		6:11	22: 7:50 3:04 1:49
27	Fri.	1:00		6:12	23: 7:50 3:52 2:42
28	Sa.	2:00		6:13	24: 7:51 4:37 3:37
29	Sun.	3:00		6:14	25: 7:52 5:21 4:35
30	Mon.	4:00		6:15	26: 7:52 6:03 5:35
31	Tu.	5:00		6:16	27: 7:53 6:43 6:37

↑ Moonrise, ♀ ☽ (9 pm), ♀ ☽ (10:57 p.m.)

**Astronomical Calendar for 2017**

4th Month		April 2017 30 Days									
Moon Phases — First Qtr., April 3, 1:39 p.m.; Full, April 11, 1:08 a.m.; Last Qtr., April 19, 4:57 a.m.; New, April 26, 7:16 a.m.											
Day of Month	Year Week	Planetary Configurations and Phenomena				Hour of				Moonrise	Moonset
		Sat.	Su.	Mo.	Frst qtr. ☽	Tu.	We.	Th.	Fr.		
91	1	Sa.	Su.	Mo.	Frst qtr. ☽	We.	Th.	Fr.	Sat.	7:26	7:57
92	2	Su.	Mo.	Frst qtr. ☽	Fr.	Th.	We.	Fr.	Sat.	7:25	7:57
93	3	Mo.	Frst qtr. ☽	Fr.	Fr.	We.	Fr.	Su.	Sat.	7:23	7:58
94	4	Tu.	Fr.	Fr.	Fr.	Fr.	Fr.	Su.	Sat.	7:22	7:59
95	5	We.	Sa.	Sa.	Sa.	Sa.	Sa.	Su.	Sat.	7:21	7:59
96	6	Th.	Su.	Su.	Su.	Su.	Su.	Su.	Su.	7:20	8:00
97	7	Fr.	Regulus ☽ (12 am)	Sa.	Sa.	Sa.	Sa.	Su.	Su.	7:18	8:01
98	8	Sa.	Sa.	Sa.	Sa.	Sa.	Sa.	Su.	Su.	7:17	8:01
99	9	Su.	Su.	Su.	Su.	Su.	Su.	Su.	Su.	7:16	8:02
100	10	Mo.	Mo.	Mo.	Mo.	Mo.	Mo.	Mo.	Mo.	7:15	8:03
101	11	Tu.	Tu.	Tu.	Tu.	Tu.	Tu.	Tu.	Tu.	7:14	8:03
102	12	We.	We.	We.	We.	We.	We.	We.	We.	7:12	8:04
103	13	Th.	Th.	Th.	Th.	Th.	Th.	Th.	Th.	7:11	8:05
104	14	Fr.	Fr.	Fr.	Fr.	Fr.	Fr.	Fr.	Fr.	7:10	8:05
105	15	Sa.	☽ at apogee (5 am)	Sa.	Sa.	Sa.	Sa.	Sa.	Sa.	7:09	8:06
106	16	Su.	Su.	Su.	Su.	Su.	Su.	Su.	Su.	7:08	8:07
107	17	Mo.	Mo.	Mo.	Mo.	Mo.	Mo.	Mo.	Mo.	7:07	8:07
108	18	Tu.	Tu.	Tu.	Tu.	Tu.	Tu.	Tu.	Tu.	7:06	8:08
109	19	We.	>Last qtr. ☽	We.	We.	We.	We.	We.	We.	7:05	8:09
110	20	Th.	Th.	Th.	Th.	Th.	Th.	Th.	Th.	7:03	8:09
111	21	Fr.	Fr.	Fr.	Fr.	Fr.	Fr.	Fr.	Fr.	7:02	8:10
112	22	Sa.	Sa.	Sa.	Sa.	Sa.	Sa.	Sa.	Sa.	7:01	8:11
113	23	Su.	Su.	Su.	Su.	Su.	Su.	Su.	Su.	7:00	8:11
114	24	Mo.	Mo.	Mo.	Mo.	Mo.	Mo.	Mo.	Mo.	6:59	8:12
115	25	Tu.	Tu.	Tu.	Tu.	Tu.	Tu.	Tu.	Tu.	6:58	8:13
116	26	We.	New ☽	We.	We.	We.	We.	We.	We.	6:57	8:13
117	27	Th.	☽ at perigee (11 am)	Th.	Th.	Th.	Th.	Th.	Th.	6:56	8:14
118	28	Fr.	Fr.	Fr.	Fr.	Fr.	Fr.	Fr.	Fr.	6:55	8:15
119	29	Sa.	Sa.	Sa.	Sa.	Sa.	Sa.	Sa.	Sa.	6:54	8:15
120	30	Su.	Su.	Su.	Su.	Su.	Su.	Su.	Su.	6:53	8:16

<b>5th Month</b>	<b>May 2017</b>	<b>31 Days</b>
<b>Moon Phases</b> —	<i>First Qtr, May 2, 9:47 p.m.; Full, May 10, 4:42 p.m. Last Qtr, May 18, 7:33 p.m.; New, May 25, 2:44 p.m.</i>	

6th Month		June 2017										30 Days	
		First Qtr., June 1, 7:42 a.m.; Full, June 9, 8:10 a.m.; Last Qtr., June 17, 6:33 a.m.; New, June 23, 9:31 p.m.; First Qtr., June 30, 7:51 p.m.											
Day of	Year	Planetary Configurations and Phenomena				Hour of				Sunset	Moonrise	Moon-set	Moon
		Month	Week	Year	Thur.	Fri.	Sat.	Sun.	Mon.				
1	2017	1	1	1	First qtr. ☽					6:34	8:37	1:43	2:00
2		1	2	1		Fr.				6:34	8:37	2:40	2:37
3		1	3	1			Sa.	⌚ σ ☽ (9 pm)		6:34	8:38	3:35	3:12
4		1	4	1			Su.			6:33	8:38	4:29	3:45
5		1	5	1						6:33	8:39	5:22	4:19
6		1	6	1						6:33	8:39	6:15	4:53
7		1	7	1						6:33	8:40	7:08	5:29
8		1	8	1						6:33	8:40	8:00	6:08
9		1	9	1						6:33	8:41	8:51	6:49
10		1	10	1						6:33	8:41	9:40	7:30
11		1	11	1						6:33	8:41	10:27	8:22
12		1	12	1						6:33	8:42	11:12	9:12
13		1	13	1						6:33	8:42	11:53	10:05
14		1	14	1						6:33	8:42	12:42	11:00
15		1	15	1						6:33	8:43	12:33	11:56
16		1	16	1						6:33	8:43	1:11	12:54
17		1	17	1						6:33	8:43	1:47	1:53
18		1	18	1						6:33	8:44	2:25	2:53
19		1	19	1						6:34	8:44	3:03	3:57
20		1	20	1						6:34	8:44	3:44	5:02
21		1	21	1						6:34	8:44	4:29	6:10
22		1	22	1						6:34	8:45	7:19	7:28
23		1	23	1						6:35	8:45	6:15	8:25
24		1	24	1						6:35	8:45	7:16	9:27
25		1	25	1						6:35	8:45	8:20	10:23
26		1	26	1						6:35	8:45	9:25	11:13
27		1	27	1						6:36	8:45	10:30	11:57
28		1	28	1						6:36	8:45	11:31	
29		1	29	1						6:36	8:45	12:31	12:36
30		1	30	1						6:37	8:45	1:28	1:13

$\odot$  The Sun ● The Earth ☽ Mercury ☿ Venus ☇ Mars ☃ Jupiter ☈ Saturn ☉ Neptune ☊ Uranus ☋ Pluto ☎ opposition to the ☽



# Astronomical Calendar for 2017

10th Month		October 2017		31 Days		11th Month		November 2017		30 Days		12th Month		December 2017		31 Days					
Moon Phases — Full, Oct. 5, 1:40 p.m.; Last Qtr., Oct. 12, 7:25 a.m.; New, Oct. 19, 2:12 p.m.; First Qtr., Oct. 27, 5:22 p.m.		Moon Phases — Full, Nov. 4, 12:23 a.m.; Last Qtr., Nov. 10, 2:36 p.m.; New, Nov. 18, 5:42 a.m.; First Qtr., Nov. 26, 11:03 a.m.		Day of Week Year		Planetary Configurations and Phenomena		Hour of Day		Planetary Configurations and Phenomena		Hour of Day		Planetary Configurations and Phenomena		Hour of Day					
Month	Year	Moonth	Week	Moonth	Year	Moonth	Week	Sunrise	Sunset	Moonth	Year	Moonth	Week	Sunrise	Sunset	Moonth	Year				
274	1 Su.	7:31	7:22	5:04	3:22	305	1 We.	7:53	6:48	5:31	5:00	335	1 Fr.	7:18	5:35	4:24	4:49				
275	2 Mo.	7:32	7:21	5:44	4:19	306	2 Th.	6:48	6:10	6:02	6:02	336	2 Sa.	7:19	5:35	5:12	5:57				
276	3 Tu.	7:30	7:20	6:22	5:17	307	3 Fr.	7:55	6:46	6:52	7:07	337	3 Sun.	7:20	5:35	6:30	7:06				
277	4 We.	7:33	7:18	7:00	6:17	308	4 Sa.	7:55	6:46	7:37	8:14	338	4 Mo. (at perigee 3 am)	7:21	5:35	7:04	8:14				
278	5 Th.	7:34	7:17	7:38	7:19	309	5 Su.	DST ends	(at perigee)	6:56	5:45	7:27	8:21	339	5 Tu.	7:21	5:35	8:07	9:19		
279	6 Fr.	7:34	7:16	8:18	8:22	310	6 Mo.	6:57	5:45	8:22	9:29	340	6 We.	7:22	5:35	9:12	10:18				
280	7 Sa.	7:35	7:15	9:01	9:26	311	7 Tu.	6:58	5:44	9:21	10:33	341	7 Th.	7:23	5:35	10:18	11:11				
281	8 Su.	7:36	7:13	9:47	10:32	312	8 We.	6:59	5:43	10:23	11:33	342	8 Fr.	7:24	5:35	11:21	11:57				
282	9 Mo.	7:36	7:12	10:37	11:37	313	9 Th.	7:00	5:42	11:26	12:27	343	9 Sa.	7:24	5:35	12:38	12:38				
283	10 Tu.	7:37	7:11	11:31	12:41	314	10 Fr.	Last qtr. ☽		13:15		344	10 Su.	Last qtr. ☽		7:25	5:35	12:22	1:16		
284	11 We.	7:38	7:10	1:42	1:42	315	11 Sa.	7:01	5:41	12:28	1:58	345	11 Mo.	7:26	5:36	1:21	1:51				
285	12 Th.	Last qtr. ☽		3:28	3:16	316	12 Su.	7:02	5:41	1:29	2:37	346	12 Tu.	7:27	5:36	2:17	2:25				
286	13 Fr.			7:39	7:08	317	13 Mo.	7:03	5:40	2:28	3:13	347	13 We.	7:27	5:36	3:13	2:59				
287	14 Sa.			7:31	7:15	318	14 Tu.	7:04	5:40	3:26	3:48	348	14 Th.	7:28	5:37	4:07	3:34				
288	15 Su.	⌚ Regulus (6 am)		7:40	7:05	319	15 We.	7:05	5:39	4:22	4:22	349	15 Fr.	7:28	5:37	5:02	4:10				
289	16 Mo.			7:41	7:04	320	16 Th.	7:06	5:39	5:17	4:56	350	16 Sa.	7:29	5:37	5:55	4:50				
290	17 Tu.			7:45	7:03	321	17 Fr.	7:06	5:38	6:12	5:32	351	17 Su.	7:30	5:38	6:48	5:32				
291	18 We.			7:42	7:02	322	18 Sa.	New ☽		7:07	6:10	352	18 Mo.	New ☽ at apogee		7:30	5:38	7:39	6:17		
292	19 Th.	New ☽		7:43	7:01	323	19 Su.	7:08	5:37	8:00	6:51	353	19 Tu.	7:31	5:38	8:27	7:06				
293	20 Fr.			7:44	7:00	324	20 Mo.	⌚ (6 pm)		7:09	5:37	8:21	7:35	354	20 We.	7:31	5:39	9:56	7:56		
294	21 Sa.			7:45	6:59	325	21 Tu.	(at apogee 1 pm)		7:10	5:37	9:43	8:21	355	21 Th.	Solstice (10:28 am)		7:32	5:39	9:56	8:49
295	22 Su.			7:45	6:58	326	22 We.	7:11	5:36	10:30	9:10	356	22 Fr.			7:32	5:40	10:36	9:43		
296	23 Mo.			7:46	6:57	327	23 Th.	7:12	5:36	11:15	10:02	357	23 Sa.			7:33	5:41	11:14	10:37		
297	24 Tu.	⌚ (at apogee 9 pm)		7:47	6:56	328	24 Fr.	7:12	5:36	11:57	10:55	358	24 Sa.			7:33	5:41	11:49	11:33		
298	25 We.			7:48	6:55	329	25 Sa.	7:13	5:35	12:36	11:49	359	25 Su.			7:34	5:42	12:24			
299	26 Th.			7:48	6:54	330	26 Su.	First dtr. ☽; ♀ ☽		7:14	5:35	1:13		360	26 Tu.	First qtr. ☽		7:34	5:42	12:59	12:30
300	27 Fr.	First qtr. ☽		7:49	6:53	331	27 Mo.	⌚ Spica (6 pm)		7:15	5:35	1:50	1:45	361	27 We.			7:34	5:43	1:36	1:28
301	28 Sa.			7:49	6:52	332	28 Su.	⌚ ♀ ☽ (3 am)		7:16	5:35	2:26	1:43	362	28 Tu.			7:35	5:44	2:58	2:29
302	29 Su.			7:51	6:51	333	29 Mo.	7:17	5:35	3:03	2:42	363	29 Fr.			7:35	5:44	3:33			
303	30 Su.			7:51	6:50	334	30 Th.	⌚ (4 am)		7:17	5:35	3:42	3:45	364	30 Sa.	Aidebaran ☽ (7 pm)		7:35	5:45	3:47	4:40
304	31 Tu.			7:52	6:49	335	31 Su.	Daylight Saving Time ends at 2 a.m.		7:17	5:35	3:45		365	31 Tu.			7:36	5:46	4:42	5:48